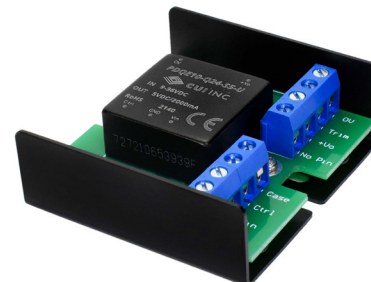


**SERIES: PDQE10-U | DESCRIPTION: DC-DC CONVERTER**
**FEATURES**

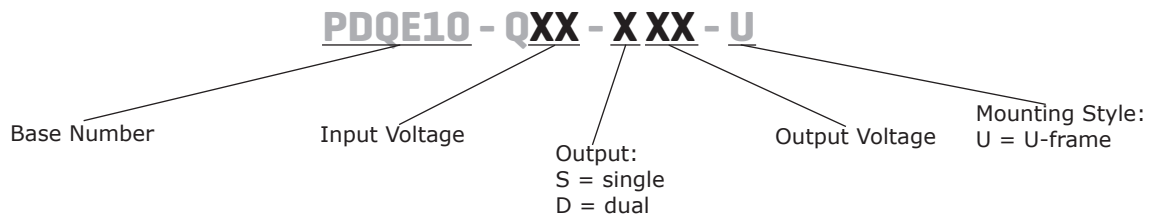
- up to 10 W isolated output
- 1,500 Vdc isolation
- ultra-wide 4:1 input range (9~36 Vdc, 18~75 Vdc)
- same side input/output connections
- single/dual regulated outputs
- input under-voltage, output short-circuit, over-current, & over-voltage protections
- wide operating temperature range (-40~85°C)
- efficiency up to 88%
- EN 62368-1
- meets UL 62368


**MODEL**

|                  | input voltage |             | output voltage | output current |          | output power max | ripple & noise <sup>1</sup> max | efficiency <sup>2</sup> typ |
|------------------|---------------|-------------|----------------|----------------|----------|------------------|---------------------------------|-----------------------------|
|                  | typ (Vdc)     | range (Vdc) |                | min (mA)       | max (mA) |                  |                                 |                             |
| PDQE10-Q24-D5-U  | 24            | 9~36        | ±5             | 0              | ±1000    | 10               | 80                              | 83                          |
| PDQE10-Q24-D9-U  | 24            | 9~36        | ±9             | 0              | ±555     | 10               | 80                              | 86                          |
| PDQE10-Q24-D12-U | 24            | 9~36        | ±12            | 0              | ±416     | 10               | 80                              | 87                          |
| PDQE10-Q24-D15-U | 24            | 9~36        | ±15            | 0              | ±333     | 10               | 80                              | 87                          |
| PDQE10-Q24-D24-U | 24            | 9~36        | ±24            | 0              | ±208     | 10               | 80                              | 87                          |
| PDQE10-Q24-S3-U  | 24            | 9~36        | 3.3            | 0              | 2400     | 7.9              | 80                              | 78                          |
| PDQE10-Q24-S5-U  | 24            | 9~36        | 5              | 0              | 2000     | 10               | 80                              | 83                          |
| PDQE10-Q24-S9-U  | 24            | 9~36        | 9              | 0              | 1111     | 10               | 80                              | 85                          |
| PDQE10-Q24-S12-U | 24            | 9~36        | 12             | 0              | 833      | 10               | 80                              | 86                          |
| PDQE10-Q24-S15-U | 24            | 9~36        | 15             | 0              | 667      | 10               | 80                              | 86                          |
| PDQE10-Q24-S24-U | 24            | 9~36        | 24             | 0              | 416      | 10               | 80                              | 88                          |
| PDQE10-Q48-D5-U  | 48            | 18~75       | ±5             | 0              | ±1000    | 10               | 80                              | 83                          |
| PDQE10-Q48-D12-U | 48            | 18~75       | ±12            | 0              | ±416     | 10               | 80                              | 87                          |
| PDQE10-Q48-D15-U | 48            | 18~75       | ±15            | 0              | ±333     | 10               | 80                              | 87                          |
| PDQE10-Q48-D24-U | 48            | 18~75       | ±24            | 0              | ±208     | 10               | 80                              | 87                          |
| PDQE10-Q48-S3-U  | 48            | 18~75       | 3.3            | 0              | 2400     | 7.9              | 80                              | 79                          |
| PDQE10-Q48-S5-U  | 48            | 18~75       | 5              | 0              | 2000     | 10               | 80                              | 83                          |
| PDQE10-Q48-S12-U | 48            | 18~75       | 12             | 0              | 833      | 10               | 80                              | 87                          |
| PDQE10-Q48-S15-U | 48            | 18~75       | 15             | 0              | 667      | 10               | 80                              | 87                          |
| PDQE10-Q48-S24-U | 48            | 18~75       | 24             | 0              | 416      | 10               | 80                              | 88                          |

- Notes:
1. From 5~100% load, 20 MHz bandwidth oscilloscope, using the "parallel cable" method for testing.  
From 0~5% load, ripple and noise is <±5% Vo.
  2. Measured at nominal input voltage and rated load.
  3. All specifications are measured at Ta=25°C, humidity < 75%, nominal input voltage, and rated output load unless otherwise specified.

## PART NUMBER KEY



## INPUT

| parameter                   | conditions/description                                                                                                                                 | min  | typ                                       | max            | units                        |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------|----------------|------------------------------|
| operating input voltage     | 24 Vdc input models                                                                                                                                    | 9    | 24                                        | 36             | Vdc                          |
|                             | 48 Vdc input models                                                                                                                                    | 18   | 48                                        | 75             | Vdc                          |
| start-up voltage            | 24 Vdc input models                                                                                                                                    |      |                                           | 9              | Vdc                          |
|                             | 48 Vdc input models                                                                                                                                    |      |                                           | 18             | Vdc                          |
| surge voltage               | for maximum of 1 second                                                                                                                                |      |                                           |                |                              |
|                             | 24 Vdc input models                                                                                                                                    | -0.7 |                                           | 50             | Vdc                          |
|                             | 48 Vdc input models                                                                                                                                    | -0.7 |                                           | 100            | Vdc                          |
| under voltage shutdown      | 24 Vdc input models                                                                                                                                    | 5.5  | 6.5                                       |                | Vdc                          |
|                             | 48 Vdc input models                                                                                                                                    | 12   | 15.5                                      |                | Vdc                          |
| current (full load/no load) | 24 Vdc input models                                                                                                                                    |      | 3.3 Vdc output models<br>all other models | 423/5<br>502/5 | 434/12<br>514/12<br>mA<br>mA |
|                             | 48 Vdc input models                                                                                                                                    |      | 3.3 Vdc output models<br>all other models | 190/4<br>251/4 | 215/8<br>258/8<br>mA<br>mA   |
| remote on/off (CTRL)        | module ON (3.5~12 Vdc or CTRL pin open circuit or pulled high)<br>module OFF (0~1.2 Vdc CTRL pin pulled low to GND)<br>input current when switched off |      | 6                                         | 10             | mA                           |
| start-up time               | nominal input, constant resistance load                                                                                                                |      | 10                                        |                | ms                           |
| filter                      | Pi filter                                                                                                                                              |      |                                           |                |                              |
| no load power consumption   |                                                                                                                                                        |      | 0.12                                      |                | W                            |

## OUTPUT

| parameter                            | conditions/description                | min | typ  | max   | units |
|--------------------------------------|---------------------------------------|-----|------|-------|-------|
| maximum capacitive load <sup>4</sup> | 3.3, 5 Vdc output models              |     |      | 2,200 | μF    |
|                                      | ±5 Vdc output models                  |     |      | 1,000 | μF    |
|                                      | 9, ±9 Vdc output models               |     |      | 680   | μF    |
|                                      | 12, ±12 Vdc output models             |     |      | 470   | μF    |
|                                      | 15, ±15 Vdc output models             |     |      | 330   | μF    |
|                                      | 24, ±24 Vdc output models             |     |      | 100   | μF    |
| voltage accuracy <sup>5</sup>        | 0% to full load                       |     | ±1   | ±3    | %     |
| line regulation                      | from low line to high line, full load |     |      |       |       |
|                                      | positive outputs                      |     | ±0.2 | ±0.5  | %     |
|                                      | negative outputs                      |     | ±0.5 | ±1    | %     |
| load regulation <sup>6</sup>         | from 5% to full load                  |     |      |       |       |
|                                      | positive outputs                      |     | ±0.5 | ±1    | %     |
|                                      | negative outputs                      |     | ±0.5 | ±1.5  | %     |

## OUTPUT (CONTINUED)

| parameter                        | conditions/description                                                                | min | typ | max   | units |
|----------------------------------|---------------------------------------------------------------------------------------|-----|-----|-------|-------|
| cross regulation                 | dual output models:<br>positive output 50% load<br>secondary output from 10~100% load |     |     | ±5    | %     |
| switching frequency <sup>7</sup> | PWM mode                                                                              |     | 350 |       | kHz   |
| transient recovery time          | 25% load step change, nominal input voltage                                           |     | 300 | 500   | µs    |
| transient response deviation     | 25% load step change, nominal input voltage                                           |     | ±3  | ±5    | %     |
| temperature coefficient          | at full load                                                                          |     |     | ±0.03 | %/°C  |

Note:

4. Specified maximum capacitive load for positive and negative outputs is identical.
5. Output voltage accuracy of ±5 Vdc/±9 Vdc output converter for 0%~5% load is ±5% max.
6. Load regulation for 0%~100% load is ±5%.
7. Switching frequency is measured at full load. Module reduces switching frequency at light load (below 50%), to increase efficiency.

## PROTECTIONS

| parameter                | conditions/description    | min | typ | max | units |
|--------------------------|---------------------------|-----|-----|-----|-------|
| over voltage protection  |                           | 110 |     | 160 | %     |
| over current protection  |                           | 110 | 140 | 190 | %     |
| short circuit protection | continuous, auto recovery |     |     |     |       |

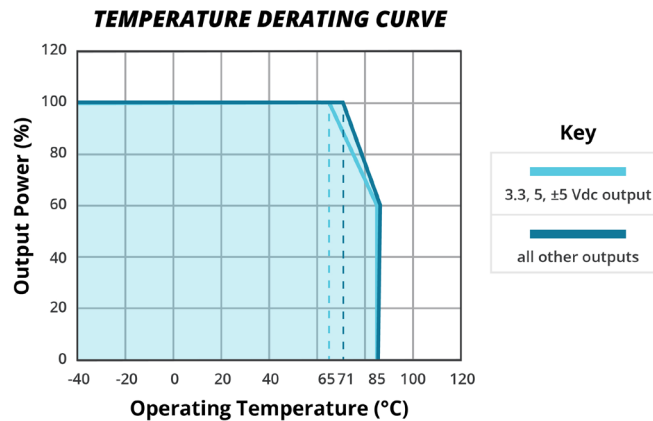
## SAFETY AND COMPLIANCE

| parameter                    | conditions/description                                                                                                                                                                          | min       | typ   | max | units |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|-----|-------|
| isolation voltage            | input to output for 1 minute at 1 mA                                                                                                                                                            | 1,500     |       |     | Vdc   |
| isolation resistance         | input to output at 500 Vdc                                                                                                                                                                      | 1,000     |       |     | MΩ    |
| isolation capacitance        | input to output, 100 kHz / 0.1 V                                                                                                                                                                |           | 1,000 |     | pF    |
| safety approvals             | certified to 62368: EN, IEC                                                                                                                                                                     |           |       |     |       |
| conducted emissions          | CISPR32/EN55032 CLASS A (without extra components), CLASS B (see Fig. 3-2)<br>EN50121-3-2 150kHz-500kHz 99dBuV (see Fig. 3-2)<br>EN55016-2-1 500kHz-30MHz 93dBuV (see Fig. 3-2)                 |           |       |     |       |
| radiated emissions           | CISPR32/EN55032 CLASS A (without extra components), CLASS B (see Fig. 3-2)<br>EN50121-3-2 30MHz-230MHz 40dBuV/m at 10m (see Fig. 3-2)<br>EN55016-2-1 230MHz-1GHz 47dBuV/m at 10m (see Fig. 3-2) |           |       |     |       |
| ESD                          | IEC/EN61000-4-2 Contact ±4kV perf. Criteria B<br>EN50121-3-2 Contact ±6kV/Air ±8kV perf. Criteria A                                                                                             |           |       |     |       |
| radiated immunity            | IEC/EN61000-4-3 10V/m perf. Criteria A<br>EN50121-3-2 20V/m perf. Criteria A                                                                                                                    |           |       |     |       |
| EFT/burst                    | IEC/EN61000-4-4 ±2kV perf. Criteria B<br>EN50121-3-2 ±2kV 5/50ns 5kHz (see Fig. 3-1) perf. Criteria A                                                                                           |           |       |     |       |
| surge                        | IEC/EN61000-4-5 line to line ±2kV (see Fig. 3-1) perf. Criteria B<br>EN50121-3-2 line to line ±1kV (42Ω, 0.5µF) (see Fig. 3-1) perf. Criteria A                                                 |           |       |     |       |
| conducted immunity           | IEC/EN61000-4-6 3 Vr.m.s perf. Criteria A<br>EN50121-3-2 0.15MHz-80MHz 10V r.m.s perf. Criteria A                                                                                               |           |       |     |       |
| voltage dips & interruptions | IEC/EN61000-4-29 0%, 70% perf. Criteria B                                                                                                                                                       |           |       |     |       |
| MTBF                         | as per MIL-HDBK-217F, 25°C                                                                                                                                                                      | 1,000,000 |       |     | hours |
| RoHS                         | yes                                                                                                                                                                                             |           |       |     |       |

## ENVIRONMENTAL

| parameter             | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curve     | -40 |     | 85  | °C    |
| storage temperature   |                        | -55 |     | 125 | °C    |
| storage humidity      | non-condensing         | 5   |     | 95  | %     |

## DERATING CURVES



## SOLDERABILITY

| parameter                            | conditions/description          | min | typ | max | units |
|--------------------------------------|---------------------------------|-----|-----|-----|-------|
| pin soldering resistance temperature | 1.5 mm from case for 10 seconds |     |     | 300 | °C    |

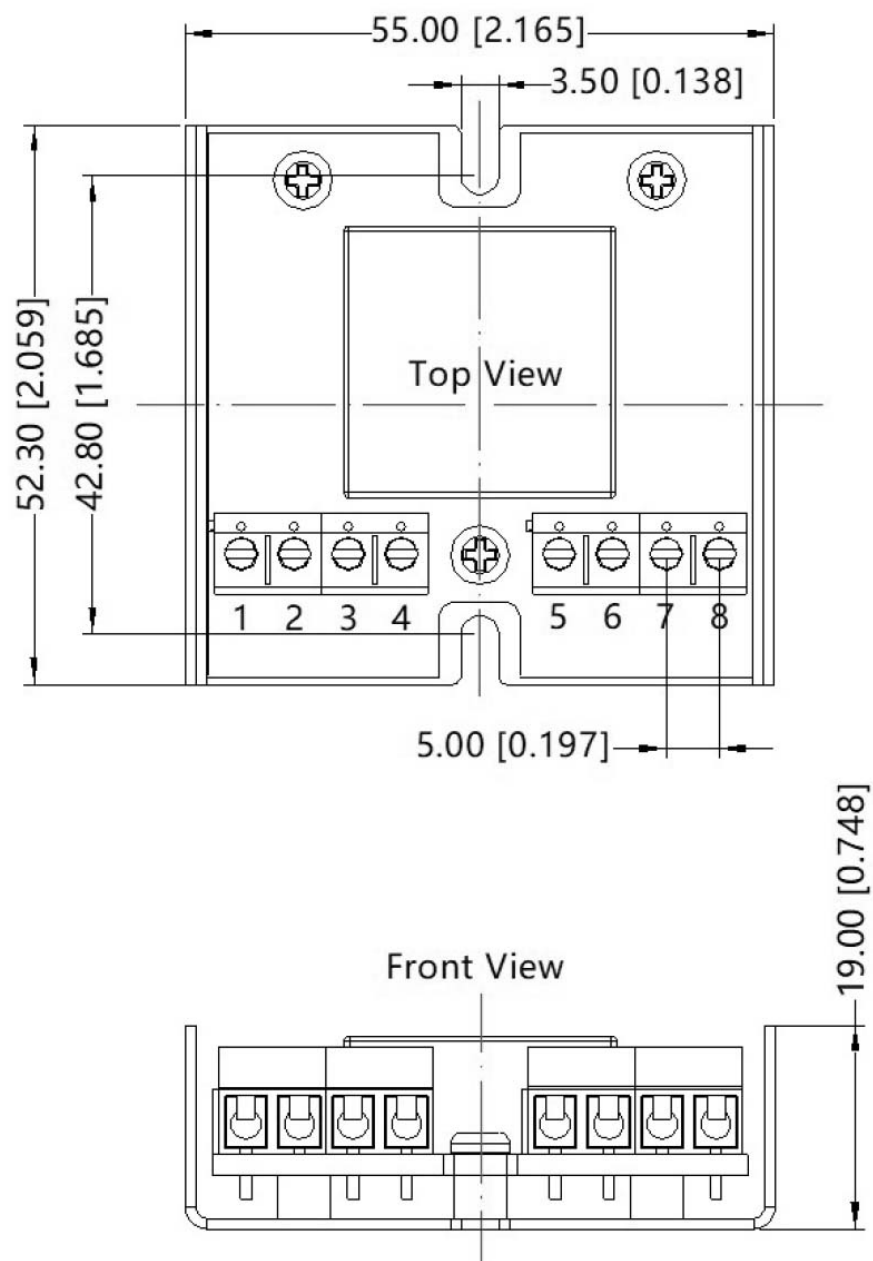
## MECHANICAL

| parameter     | conditions/description                             | min | typ | max | units |
|---------------|----------------------------------------------------|-----|-----|-----|-------|
| dimensions    | 55.00 x 52.30 x 19.00 [2.165 x 2.059 x 0.748 inch] |     |     |     | mm    |
| case material | aluminum alloy                                     |     |     |     |       |
| weight        |                                                    |     | 44  |     | g     |

## MECHANICAL DRAWING

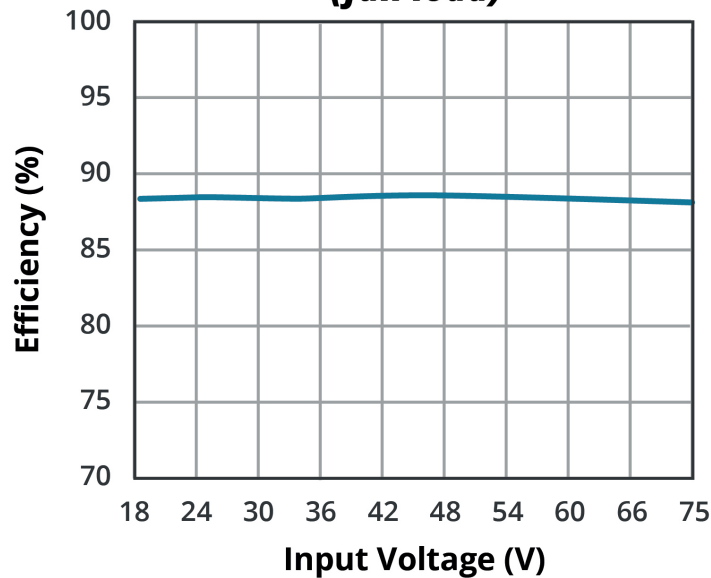
units: mm [inch]  
 wire range: 24-12 AWG  
 tolerance:  $\pm 1.00[\pm 0.039]$   
 tightening torque: Max 0.4 N·m

| PIN CONNECTIONS |          |      |
|-----------------|----------|------|
| PIN             | Function |      |
|                 | Single   | Dual |
| 1               | GND      | GND  |
| 2               | Vin      | Vin  |
| 3               | Ctrl     | Ctrl |
| 4               | Case     | Case |
| 5               | NC       | NC   |
| 6               | +Vo      | +Vo  |
| 7               | NC       | 0V   |
| 8               | 0V       | -Vo  |

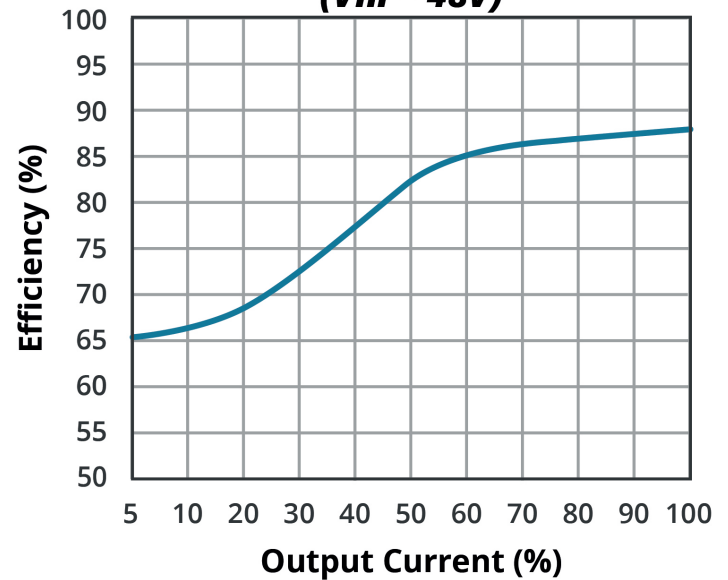


## EFFICIENCY CURVES

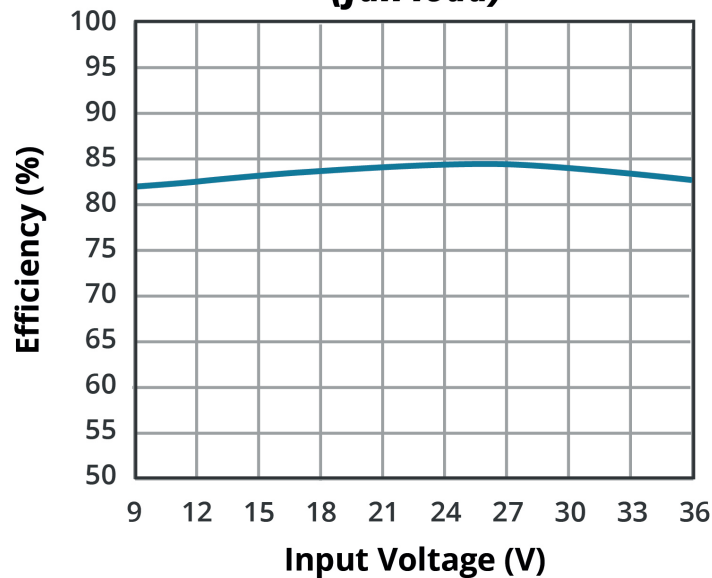
**EFFICIENCY VS INPUT VOLTAGE**  
**PDQE10-Q48-D15-U**  
**(full load)**



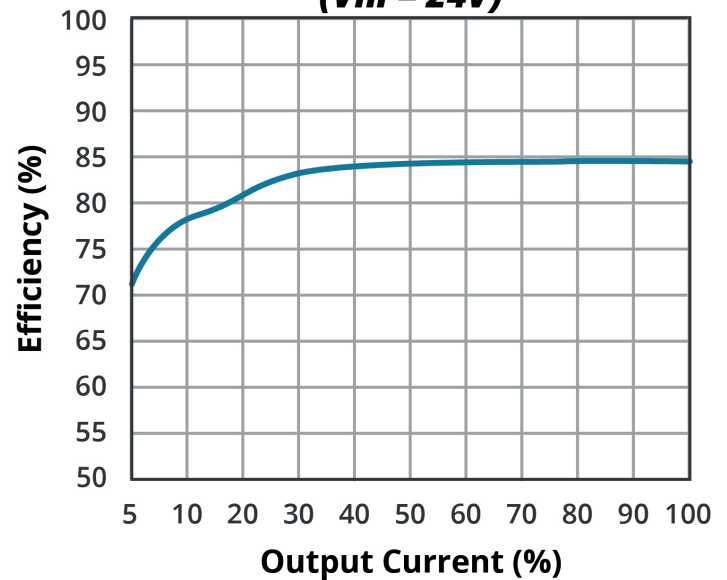
**EFFICIENCY VS OUTPUT LOAD**  
**PDQE10-Q48-D15-U**  
**( $V_{in} = 48V$ )**



**EFFICIENCY VS INPUT VOLTAGE**  
**PDQE10-Q24-S5-U**  
**(full load)**



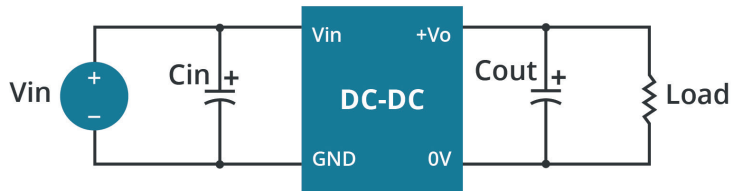
**EFFICIENCY VS OUTPUT LOAD**  
**PDQE10-Q24-S5-U**  
**( $V_{in} = 24V$ )**



## APPLICATION CIRCUIT

This series has been tested according to the following recommended circuits (Figures 1 & 2) before leaving the factory. If you want to further reduce the input and output ripple, you can increase the input and output capacitors or select capacitors of low equivalent series resistance (ESR) provided that the capacitance is less than the maximum capacitive load of the model.

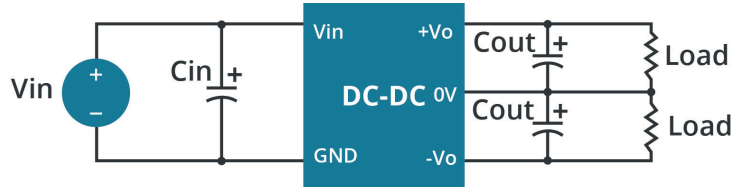
**Figure 1**  
Single Output Models



**Table 1**

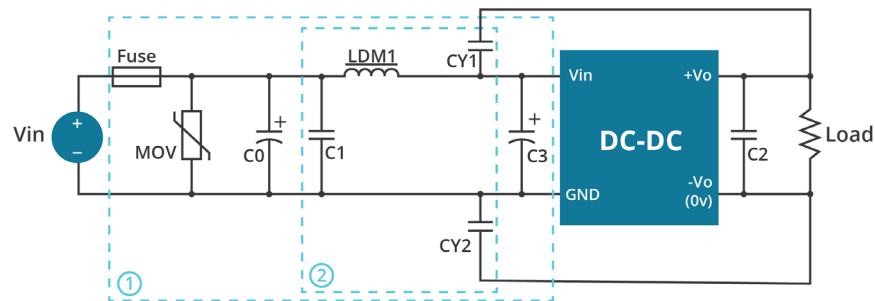
| Vin (Vdc) | Cin (μF/V) | Vout (Vdc)    | Cout (μF/V) |
|-----------|------------|---------------|-------------|
| 24        | 100/50     | ±5/±9/3.3/5/9 | 10/16       |
|           |            | ±12/±15/12/15 | 10/25       |
|           |            | ±24/24        | 10/50       |
| 48        | 10~47/100  | ±5/3.3/5      | 10/16       |
|           |            | ±12/±15/12/15 | 10/25       |
|           |            | ±24/24        | 10/50       |

**Figure 2**  
Dual Output Models



## EMC RECOMMENDED CIRCUIT

**Figure 3**



**Table 2**

| Recommended External Circuit Components |                                          |              |
|-----------------------------------------|------------------------------------------|--------------|
| Vin (Vdc)                               | 24                                       | 48           |
| FUSE                                    | choose according to actual input current |              |
| MOV                                     | S20K30                                   | S14K60       |
| C0/C3                                   | 330μF / 50V                              | 330μF / 100V |
| C1                                      | 1μF / 50V                                | 1μF / 100V   |
| C2                                      | refer to the Cout in Figure 1 & 2        |              |
| LDM1                                    | 4.7μH                                    |              |
| CY1, CY2                                | 1nF / 2kV                                |              |

## REVISION HISTORY

| rev. | description     | date       |
|------|-----------------|------------|
| 1.0  | initial release | 12/07/2021 |

The revision history provided is for informational purposes only and is believed to be accurate.



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CUI offers a two (2) year limited warranty. Complete warranty information is listed on our website.

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